THE BLUE-EYED-GRASSES (*SISYRINCHIUM*: IRIDACEAE) OF ARKANSAS

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ABSTRACT

Data obtained from morphological characters and chromosome number indicate that seven species of *Sisyrinchium* should be recognized for Arkansas: *S. albidum* Raf., *S. angustifolium* Mill., *S. atlanticum* Bickn., *S. campestre* Bickn., *S. langloisii* Greene [*S. pruinosum* Bickn.], *S. rosulatum* Bickn. [*S. exile* Bickn.], and *S. sagittiferum* Bickn. These seven taxa are different from the eight previously recognized by Smith in that *S. sagittiferum* Bickn. was not listed and *S. langloisii* Greene and *S. pruinosum* Bickn., plus *S. rosulatum* Bickn. and *S. exile* Bickn., were listed as four distinct species. Distribution maps were produced using herbarium voucher specimens.

INTRODUCTION

The genus *Sisyrinchium* consists of both herbaceous perennials and annuals with simple or branched stems that may or may not be conspicuously winged. The flowers are epigynous, subtended by a spathe (made of two overlapping bracts), and have undifferentiated actinomorphic perianths. The mucronulate to aristulate tepals range in color from white or yellow with purple stripes and a purple eye-ring to more typically blue, purple, or white with a yellow eye-ring.

No major revision had been done on this genus in the southeastern United States since Small (1933), which did not include the state of Arkansas. Smith (1978) recognized eight species for the state: *S. albidum* Raf., *S. angustifolium* Mill., *S. atlanticum* Bickn., *S. campestre* Bickn., *S. exile* Bickn., *S. langloisii* Greene, *S. pruinosum* Bickn., and *S. rosulatum* Bickn. Therefore, as part of a taxonomic revision on this genus in the SE U.S. for the Southeastern Flora Project (Massey & Radford 1981), which includes Arkansas, special attention was paid to this state's species in order to update Smith's Atlas (1978).

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A) Morphology

Several hundred herbarium specimens of Blue-eyed-grass for the state were examined for 24 different characters (Hornberger 1987a). Discriminant analysis indicated that of these 24 characters, the following provided the best separation for Arkansas species: paired vs. single spathes, length of outer to inner spathe bracts (equal to subequal vs. unequal), connation of outer spathe bract, stem width (includes wing on either side of raised center portion), stem wing width (average value of both wings), and dried capsule color and shape. Flower color and shape are also important characters, but do not preserve well, and are, therefore, not readily available from herbarium specimens. However, they are included, along with the characters mentioned above, in the taxonomic key which follows this section.

Essentially there are two basic morphological groups, one with simple stems (*S. albidum* Raf., *S. campestre* Bickn., and *S. sagittiferum* Bickn.) and one with branched stems (*S. angustifolium* Mill., *S. atlanticum* Bickn., *S. langloisii* Greene, and *S. rosulatum* Bickn.). The species with simple stems are arranged in one of two ways: 1) the stems have either single spathes on a scape that has no cauline leaf, hence, there is no node or 2) the stems have paired sessile spathes (sometimes a single one) subtended by a cauline leaf. This latter type of stem is considered to have one node. Some of the simple-stemmed species may, however, occasionally branch, particularly *S. sagittiferum* Bickn. (Hornberger 1987a). Species that typically have branched stems have one or more nodes, each of which has a cauline leaf and one or more pedunculate spathes.

B) Chromosome Number

Chromosome reports in the literature indicate that the genus is based on $x = 8$, with most of the species being tetraploids (Oliver & Lewis 1962; Oliver 1966; Goldblatt 1982; and others).

Among these chromosome reports were counts of $n = 16$ from flower bud material for only two species collected in Arkansas, *S. campestre* Bickn. and *S. langloisii* Greene (the latter taxon reported as *S. pruinosum*, Oliver & Lewis 1962; Lewis & Oliver 1961). I was able to confirm this number for *S. campestre* Bickn. from two different Arkansas populations, one in HotSpring Co. and the other in Washington Co. (Hornberger 1987a).

I also obtained the count of $n = 16$ from flower bud material for *S. langloisii* Greene, *S. rosulatum* Bickn., and *S. sagittiferum* Bickn., all collected, however, in Louisiana (Hornberger 1987a, b).

Sisyrinchium albidum Raf. was reported as n = 16 from Louisiana by Oliver & Lewis (1962). This number was originally reported by Bowden (1945) for a population collected in Virginia. It was further supported by Ingram (1964) for a population in Tennessee. Even though I have not had the opportunity to count the number for this species, it appears to be one of the tetraploid blue-eyed-grasses.

Sisyrinchium angustifolium Mill. has been reported as n = 48 from Louisiana by Oliver & Lewis (1962); they also reported this number for several populations in Texas. I have seen these specimens and agree with their identification. Hill (1984) recorded this same number for a Virginia population. However, Ingram (1964, 1967) reported n = 40, 44, 45 for populations in North Carolina, Tennessee, and Virginia. Goldblatt (1982) feels that these conflicting reports for the same species are probably more a reflection of misidentification or incorrect counts than cytological diversity.

Sisyrinchium atlanticum Bickn. has more reported diversity in chromosome number than the preceding taxon. Numbers range from n = 8 (Oliver 1966) to n = 16 (Ingram 1964; Oliver 1966; Hill 1984) to n = 48 (Oliver & Lewis 1962). I have seen the specimens collected by Oliver (1966) and I agree with the identifications. However, I have seen the herbarium specimen (Oliver 253, ASTC) of one of the two populations collected by Oliver & Lewis (1962) from Texas that was identified as *S. atlanticum* Bickn.; this specimen represents *S. biforme* Bickn., a species seemingly restricted to the Gulf Coast and offshore islands.

C) Synonymy

The genus *Sisyrinchium* has been misunderstood taxonomically for more than a century. Because of subtle differences in morphology, disagreements among botanists on recognition of legitimate taxa, synonymy, or the proper epithet for a taxon have led to a plethora of species' descriptions in the literature. Nomenclatural considerations, then, became a major task of the SE U.S. revision. Holotypes were requested for all taxa, and when they were determined lost or nonexistent, neotypes and lectotypes were designated. The only type specimen not seen was the one for *S. rosulatum* Bickn. because it was unavailable for this study. A complete discussion of types and synonyms is included in Hornberger (1987a). Synonyms will only be listed in this paper if they are different from Smith (1978) and would cause confusion if not included.

KEY TO THE SPECIES IN ARKANSAS

A. Outer spathe bract not connate at base, or only slightly so (1.0 mm or less) ..... B

B. Spathes paired at top of stem; bracts of outer spathe slightly unequal; stem with a single cauline leaf subtending the spathes ..... *S. albidum* Raf.
B. Spathe single at top of stem; bracts unequal with outer one 1 1/2 – 5× length of inner one; stem with no cauline leaf subtending the spathe ..... *S. campestre* Bickn.
A. Outer spathe bract connate at base (1.1 mm or more) C
C. Spathe bracts equal to subequal ..... D
D. Outer spathe bract connate at base up to 2.0 mm .... *S. sagittiferum* Bickn.
D. Outer spathe bract connate at base for more than 2.0 mm .... E
E. Stems 2.5 mm or more wide, wings 0.9 mm or more wide *S. angustifolium* Mill.
E. Stems less than 2.5 mm wide, wings less than 0.9 mm wide ..... F
F. Capsules pale beige with purple or brown sutures, globose to subglobose; tepals white or yellow with purple stripes and purple eye-ring; flowers urceolate .... *S. rosulatum* Bickn.
F. Capsules brown to black, globose to obovate; tepals light blue to purple, sometimes white, with yellow eye-ring; flowers rotate ..... G
G. Inner spathe bract distinctly mucronate; spathes often deflected at base; capsules oblong-subglobose to obovate ..... *S. atlanticum* Bickn.
G. Inner spathe bract not mucronate; spathes not deflected at base; capsules subglobose ..... *S. langloisii* Greene
C. Spathe bracts noticeably unequal ..... H
H. Outer bract connate at base up to 2.0 mm; outer bract up to 3× length of inner bract ..... *S. sagittiferum* Bickn.
H. Outer bract connate at base more than 2.0 mm; outer bract only 1 1/2 – 2× length of inner bract ..... J
J. Stems 2.0 mm or more wide, wings 0.9 mm or more wide; tepals light blue to white with yellow eye-ring; flowers rotate; capsules dark brown ..... *S. angustifolium* Mill.
J. Stems less than 2.0 mm wide, wings less than 0.9 mm wide; tepals white or yellow with purple stripes and purple eye-ring; flowers urceolate; capsules pale beige with purple or brown sutures ..... *S. rosulatum* Bickn.

DISCUSSION

Seven species were recognized in this study and will be briefly discussed in alphabetical order.

Sisyrinchium albidum Raf. is a simple-stemmed perennial with paired sessile spathes at the node, where a large cauline leaf is found. Flowers are usually white with yellow eye-rings and the globose capsules dry pale beige to a straw color. Populations bloom late March to April and are found in prairies, woods, and roadsides.

Sisyrinchium angustifolium Mill. is the most common and most robust species of Blue-eyed-grass in the state, with fairly wide leaves and

stems with conspicuous wings. This perennial produces stems that typically have 1 node with a cauline leaf where two peduncles emerge. Flowers are light blue in color with yellow eye-rings and the globose to subglobose capsules dry dark brown. Plants are found in fields, woods, or along roadsides in April and May. This taxon has a very confusing nomenclatural history which is presented elsewhere (Hornberger 1987a), but several manuals currently in use have names considered synonyms: *S. bermudianum* L. emend. Fern. and *S. graminoides* Bickn. (Gleason & Cronquist 1963; Steyermark 1963).

Sisryinchium atlanticum Bickn. is a branched species found in scattered prairie areas in the state. Stems are terete to slightly flattened, with 1 – 2 nodes, and are narrowly winged (1 mm wide). Spathes are small, often deflected at the base; bracts are equal to subequal, and the inner bract is distinctly mucronate. The oblong-subglobose to obovate capsules dry dark brown to black. Flowers are generally light blue with yellow eye-rings, but the tepals are sometimes dark blue to purple. This perennial taxon blooms from March to April.

Sisyrinchium campestre Bickn. is commonly found in prairies, meadows, and grassy areas along roadsides in April and May. This perennial has a simple stem with a single spathe at the top of the scape. The bracts of the spathe are very noticeably unequal, with the outer one at least 1 – 1/2 to 2 times or more the length of the inner, gibbous one.

Sisyrinchium langloisii Greene is a branched perennial found along grassy roadsides, prairies, and disturbed areas in March and April. Its spathe bracts typically have a purple coloration which is often restricted to the base of the spathe. This taxon is similar in morphology to *S. pruinosum* Bickn., although the purple coloration of the spathe bracts is generally not present in the latter. Both taxa have the same chromosome number, 2n = 32 (Lewis & Oliver 1961; Oliver & Lewis 1962), and have been reported to hybridize in areas of overlapping range (Correll & Johnston 1970). Comparison of flavonoid spot profiles between a population from Texas and another from Louisiana showed similar patterns (Hornberger 1987a). Morphology, chromosome number, and flavonoid chemistry suggest that these various populations may actually be variations of one large species complex; therefore, I have synonymized *S. pruinosum* Bickn. under the older name, *S. langloisii* Greene.

Sisyrinchium rosulatum Bickn. is the only annual Blue-eyed-grass found in Arkansas, seemingly restricted to several southern counties, plus Polk County. Flowers are yellow to white with purple to maroon stripes and purple to maroon eye-rings. These flowers are urceolate, instead of rotate as displayed by the flowers of the other six taxa. Spathes are slender

and foliaceous, with the outer bract slightly falcate at the apex and often 1 – 1/2 times longer than the inner bract. Globose to subglobose capsules dry pale beige with purple to brown stripes along the sutures. Populations can be found in disturbed areas of roadsides and lawns, prairies, river bottoms, and pine woods. Synonyms include *S. exile* Bickn. (Smith 1978).

Sisyrinchium sagittiferum Bickn. is represented only from Miller County, with possible hybrids (*sagittiferum* × *langloisii*) collected in Union County. This taxon is usually represented by simple, leafless stems often with fibrous bases. Spathes are single (or sometimes paired) at the top of the scapes, being conspicuously broader than the stems. Spathe bracts are equal or the outer one can be three times the length of the inner one. Flowers are blue to purple with yellow eye-rings, bloom in March to April, and produce dark brown, globose to subglobose capsules, often with submarginal veins.

This latter taxon is most similar in morphology to *S. campestre* Bickn., but differs in several important respects: 1) *S. sagittiferum* has outer spathe bracts that are connate for several mm; *S. campestre* has non-connate outer bracts (less than 1.0 mm); 2) spathes of *S. sagittiferum* are conspicuously wider than the stems and dry brownish, often mixed with purple; *S. campestre* has bracts that dry green in color and are not conspicuously wider than the stems; and 3) *S. sagittiferum* often has fibrous leaf bases attached to the stems, *S. campestre* seldom does. *Sisyrinchium sagittiferum* Bickn. had been recorded for Arkansas by Demaree (1943), but not by Smith (1978). My study indicates that it should be considered part of Arkansas' flora.

SUMMARY

Based on data collected in this study from observation, investigation, and literature review, seven species of *Sisyrinchium* are recognized for the state of Arkansas: *S. albidum* Raf., *S. angustifolium* Mill., *S. atlanticum* Bickn., *S. campestre* Bickn., *S. langloisii* Greene, *S. rosulatum* Bickn., and *S. sagittiferum* Bickn. This information is presented in Smith (1988). Distribution maps were prepared for each taxon based on herbarium voucher specimens. A dot indicates that at least one specimen exists for a particular taxon in a particular county (Fig. 1). (Note: the dot in Union County for *S. sagittiferum* Bickn. represents possible hybrids between it and *S. langloisii* Greene).

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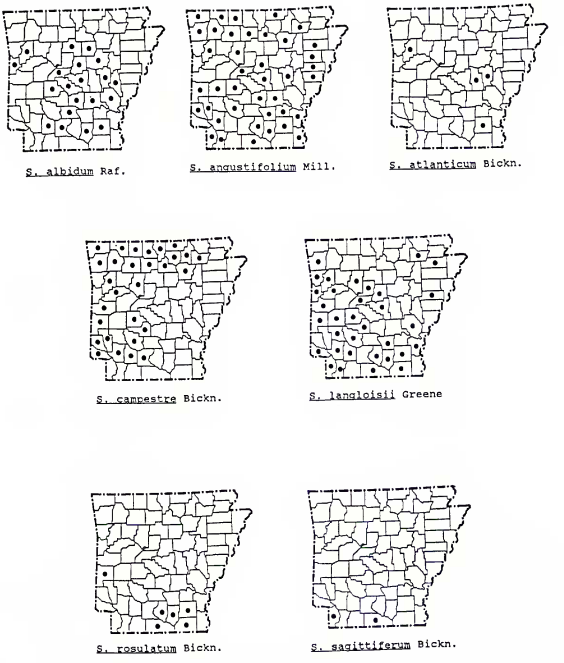

FIG. 1. Documented distribution of Arkansas *Sisyrinchium*.

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